

**REMARKS**

This paper is being presented in response to an official action dated April 11, 2007.

Claim 1 has been amended to include the elements of original claims 3 and 5. New claim 11 is presented, based on original claims 1, 5, 8, and 9. New claim 12 depends from claim 11 and parallels original claim 3.

It is respectfully submitted that it was not known in the art that a thin layer of TiO<sub>2</sub>, such as is presently recited in the claims, could be both transparent to visible light, so that it could be used in a fireproof glazing without detrimentally affecting its optical properties, and yet not similarly transparent to UV radiation. Thus, even if there was motivation to combine the prior art as alleged in the official action, the unexpected results of being able to sufficiently protect a fireproof material from UV radiation using an optically transparent layer overcome the rejection. For this reason and the other reasons provided below, the rejections can be withdrawn in view of the amended claims.

Entry of the amendments to the claims, reconsideration of the claims, and allowance of all pending claims 1-12 are respectfully requested.

**Rejections under 35 USC § 103(a)****I. Claims 1-7:**

Claims 1-7 were rejected as obvious over U.S. Patent No. 5,496,640 to Bolton et al. in view of U.S. Patent Application Publication No. 2002/0045073 A1 to Finley in view of "Exhibit Z" CEFIC, European Chemical Industry Council.

The rejection of claim 1 is traversed.

A. EXHIBIT Z IS NOT PRIOR ART WITH RESPECT TO THE PRESENT APPLICATION; THE REJECTION IS NOT SUPPORTED AND SHOULD BE WITHDRAWN

Exhibit Z bears a date of 29 December 2004. The present application is a US national phase application, and was filed on September 11, 2003. Accordingly, the application antedates Exhibit Z, and Exhibit Z does not qualify as prior art.

Non-prior art references have only limited applicability, and cannot be applied as in the present rejections for what they teach in combination with true prior art. See MPEP 2141.03 (references which do not qualify as prior art because they postdate the claimed

invention may be relied upon only to show the level of ordinary skill in the art). The official action has not applied Exhibit Z for a showing of the level of ordinary skill in the art, but rather for knowledge which is alleged to be in the prior art.

Specifically, the statements made in the official action with respect to Exhibit Z are either factually inaccurate or not applicable according to the rules, as described below.

**1. EXHIBIT Z DOES NOT TEACH A LAYER THAT REDUCES INCIDENCE OF UV RADIATION ONTO A FIREPROOF LAYER**

The official action states: “Exhibit Z teaches a layer that reduces the incidence of UV radiation onto the fireproof layer on at least one side of said fireproof layer.” This assertion is factually inaccurate on many levels. Exhibit Z does not teach a layer of  $\text{TiO}_2$ , as claimed – it states that titanium dioxide pigments are used in the production of other materials, such as paints, printing inks, paper, and plastic products. Exhibit Z says nothing regarding reducing incidence of UV radiation onto a fireproof layer – the only reference to UV is made in the context of  $\text{TiO}_2$ ’s use as a pigment in non-transparent articles:

“ $\text{TiO}_2$  is also used in many white or coloured products including foods, cosmetics, UV skin protection products, ceramics, fibres, rubber products and more. . . . It offers maximum opacity or hiding power as well as imparting whiteness and brightness to the products in which it is used. It helps paint to cover or mask other materials. It is what makes plastic packages pure white and opaque. It prevents show-through on printed paper materials, making it easy to read brochures and literature. It also affords protection from UV degradation.” (emphasis added)

Finally, Exhibit Z says nothing regarding “at least one side of said fireproof layer.”

**2. EXHIBIT Z DOES NOT TEACH THAT  $\text{TiO}_2$  HAS A HIGH REFRACTIVE INDEX AS WELL AS A HIGH REFLECTANCE WHICH WILL REDUCE INCIDENCE OF UV RADIATION ONTO A FIREPROOF LAYER**

The official action states: “Exhibit Z teaches that  $\text{TiO}_2$  has a high refractive index as well as a high reflectance, which will reduce the incidence of UV radiation onto the fireproof layer.” As explained above, Exhibit Z says nothing about fireproof layers. Furthermore, Exhibit Z does not specify the wavelength in which the refractive index is high and the reflectance is high. Exhibit Z repeatedly states that  $\text{TiO}_2$  is used as an opacifying agent, e.g. for hiding power and whiteness. In stark contrast, the claimed invention is directed to use of a very thin layer of  $\text{TiO}_2$  which is surprisingly both (a) transparent in the visible range and (b) not similarly transparent in the claimed UV range.

3. EXHIBIT Z DOES NOT TEACH THAT A THIN LAYER OF TiO<sub>2</sub> AFFORDS PROTECTION FROM UV DEGRADATION

The official action states: “Exhibit Z also teaches that the thin layer affords protection from UV degradation.” With due respect, this allegation is completely unsupported by the reference. The reference only states that TiO<sub>2</sub> affords protection from UV degradation in the context of its use as a pigment in non-transparent, opaque products – not as a layer, and not as a thin, transparent layer.

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. MPEP 2141.

“Each reference must qualify as prior art under 35 U.S.C. 102 (e.g., *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987) (“Before answering Graham's 'content' inquiry, it must be known whether a patent or publication is in the prior art under 35 U.S.C. § 102.”)) and should be in the field of applicant's endeavor, or be reasonably pertinent to the particular problem with which the inventor was concerned. *In re Oetiker*, 977 F.2d 1443, 1447, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). *Accord*, e.g., *In re Clay*, 966 F.2d 656, 658-59, 23 USPQ2d 1058, 1060 (Fed. Cir. 1992).” quoted from MPEP 2144.08, emphasis added.

Exhibit Z is not prior art and cannot be used in the manner applied in the rejection. Accordingly, the rejection is not supported and must be withdrawn.

To the extent that Exhibit Z is being used to evidence any inherent properties of TiO<sub>2</sub>, such use is inappropriate in the context of an obviousness rejection, because obviousness cannot be predicated on an inherent property which was not known in the prior art. *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966) (“That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is not known.”). To support an obviousness rejection based on inherent properties of a material, the USPTO must show that the inherent properties were known in the prior art – not in publications postdating the invention.

B. THERE IS INSUFFICIENT MOTIVATION FOR COMBINING FINLEY WITH BOLTON ET AL.

There is no motivation provided to combine Finley and Bolton et al., because someone skilled in the art could not expect any benefit from using  $\text{TiO}_2$  instead of a known solution to protect a fireproof layer from UV irradiation.

According to the official action, a person of ordinary skill in the art would combine Finley and Bolton et al. to arrive at the present invention because of some motivation to do so provided by the common knowledge that (1) fireproof layers had to be protected from UV radiation and that (2) in uses as a pigment  $\text{TiO}_2$  affords protection from UV radiation.

According to the official action, a person of ordinary skill in the art would use  $\text{TiO}_2$  instead of a known solution to protect a fireproof layer from UV irradiation apparently just because he could do it, but without expecting any advantages from the use of  $\text{TiO}_2$ .

However, it remains unclear why someone skilled in the art should do it. None of the statements or documents cited in the official action provides some indication of why the person skilled in the art should use specifically  $\text{TiO}_2$  instead of a known solution to protect a fireproof layer from UV radiation. None of the statements or of documents cited by the examiner shows any advantage of the use of  $\text{TiO}_2$  compared to known solutions to protect a fireproof layer from UV irradiation. The motivation to combine Finley and Bolton et al. remains thus unclear.

Furthermore, the Finley patent publication lacks in any teaching for using the titanium dioxide coating to reduce incident UV radiation. Even if Finley teaches that UV light may be used to activate photocatalytic properties, photoactive hydrophilicity, or both, nothing in Finley seems to indicate that UV light is reflected, absorbed, or otherwise reduced by the titanium dioxide layer disclosed therein. There are neither measurements of the absorption rate of the titanium dioxide layer in the UV region nor measurements of the amount of transmitted radiation through the titanium dioxide layer in the UV region.

Significantly, Finley teaches that if reflection or absorption of UV radiation is desired, then a separate, optional functional coating 38 should be used: “[l]ikewise, the functional coating 38 may be a solar control coating, for example, a visible, infrared or ultraviolet energy reflecting or absorbing coating.” Quoted from ¶ [0031], ten lines up from the bottom of page 3.

The motivation to use TiO<sub>2</sub> instead of a known solution to protect a fireproof layer is only given by the present application. The inventors discovered that a TiO<sub>2</sub> layer with a thickness comprised between 10 nm and 75 nm, while being simple to produce, also remains optically clear to visible light and affords broadband UV absorption of between 3 % and 15 % as well as broadband UV reflection of between 40 % and 60 % in the wavelength spectrum from 320 nm to 480 nm (page 10, lines 6-9 and lines 16-18), so that TiO<sub>2</sub> could be easily used to protect a wide range of different transparent fireproof layers.

This property was not known in the prior art, and cannot be alleged to be known on the independent bases that (1) in certain conditions (including as a very thin layer) TiO<sub>2</sub> is known to be transparent (as in Finley) and (2) in certain other conditions (as an opaque pigment in Exhibit Z, not prior art) for protection against UV degradation.

In contrast, exhibits X, Y and Z cited by the examiner all refer to TiO<sub>2</sub> as a pigment or colorant known for its excellent whitening power and its exceedingly high refractive index, which allows reducing the transparency of different materials, while giving them a white color. These properties are implicitly associated with visible light, because the references address its use as a pigment or colorant.

C. THE CLAIMS AS AMENDED FURTHER DISTINGUISH THE COMBINATION OF FINLEY WITH BOLTON ET AL.; COMBINING FINLEY WITH BOLTON ET AL. AS PROPOSED WOULD RENDER FINLEY UNSATISFACTORY FOR ITS INTENDED PURPOSE

Claim 1 has been amended and claim 12 has been presented to recite that the TiO<sub>2</sub> layer is disposed between an inner surface of an outwardly-facing glass pane and the fireproof layer. If Finley were properly combined with Bolton et al., the TiO<sub>2</sub> would be at the outer surface of an outwardly-facing glass pane. First there, is no motivation for rearranging the location of the TiO<sub>2</sub> layer in Finley. Second, even if there were motivation, the rearrangement would render Finley unsatisfactory for its intended purpose, and therefore cannot support a *prima facie* obviousness rejection.

In certain circumstances not found here, it can be *prima facie* obvious to rearrange the order of parts in the prior art. See *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950) (Claims to a hydraulic power press which read on the prior art except with regard to the position of the starting switch were held unpatentable because shifting the position of the starting switch would not have modified the operation of the device.); *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975) (the particular placement of a contact in a

conductivity measuring device was held to be an obvious matter of design choice). However, "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims . . . is not by itself sufficient to support a finding of obviousness. **The prior art must provide a motivation or reason for the worker in the art, without the benefit of appellant's specification, to make the necessary changes in the reference device.**" *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984). MPEP 2144.04 ("Legal Precedent as Source of Supporting Rationale"), emphasis added. There is no such motivation found in the applied prior art.

Moreover, the combination of Finley with Bolton et al. cannot be modified such that the TiO<sub>2</sub> layer is disposed as claimed, because it would render Finley unsatisfactory for its intended purpose. Finley uses the TiO<sub>2</sub> layer as a photocatalytic layer to reduce the frequency and/or need for cleaning glass substrates. If the TiO<sub>2</sub> layer of Finley were disposed at the inner surface of an outwardly-facing glass pane, it would not serve its purpose for reducing the frequency and/or need for cleaning. See MPEP § 2143.01 (proposed modification cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference).

**D. EVEN IF THERE WAS SUFFICIENT MOTIVATION FOR COMBINING FINLEY WITH BOLTON ET AL., THE CLAIMED INVENTION PROVIDES UNEXPECTED RESULTS**

Even if there were sufficient motivation for combining Finley with Bolton et al., there is insufficient evidence that a person of ordinary skill in the art would expect the thin TiO<sub>2</sub> layer of Finley to provide UV protection to the fire protection layer of Bolton et al., while maintaining optical clarity of the layered structure. As described above, the fact that TiO<sub>2</sub> layer sufficiently thin to be optically transparent could still provide UV absorption and reflection for protection of a fireproof layer was unknown in the prior art. This unexpected result is sufficient to traverse a *prima facie* obviousness rejection.

The rejection of claims 4-7 are traversed for the same reasons provided above with respect to claim 1.

**II. Claims 8-10:**

Claims 8-10 were rejected as obvious over U.S. Patent No. 5,496,640 to Bolton et al. in view of U.S. Patent Application Publication No. 2002/0045073 A1 to Finley

in view of “Exhibit Z” CEFIC, European Chemical Industry Council as above and further in view of Exhibit Y “Construction Materials: Types, Uses, and Applications.”

The rejections are traversed for the same reasons provided above with respect to Finley, Bolton et al. and Exhibit Z applied to independent claim 1 and for the additional reasons provided below.

Exhibit Y is applied on the basis that it “discloses that modifications have been developed to produce certain desirable characteristics for specific uses,” citing column 2, lines 9-11. First, this statement in Exhibit Y is so vague that is effectively meaningless. Second, the official action attempts to divorce this statement from its true context – particle size distribution – and instead rely on it for a teaching regarding thickness of a TiO<sub>2</sub> layer. In the original text of Exhibit Y, the quoted statement is made in a single paragraph having two sentences, and the previous sentence makes it clear that the teaching regarding modifications concerns particle size distribution:

The value of titanium pigments is also dependent on particle size distribution. Modifications have been developed to produce certain desirable characteristics for various specific uses.

Thus, the “modifications” referred to in Exhibit Y are modifications to particle size distribution – not thickness of a layer of TiO<sub>2</sub>. The reference has been misinterpreted and misapplied. On this basis alone, the rejections are not supported and should be withdrawn.

Furthermore, the official action asserts that it would have been obvious to make a TiO<sub>2</sub> film of “an appropriate thickness in order for the material to display the optical characteristics as desired.” Even taking this assertion as true, the Office has not shown that the optical characteristics recited in the claims were desired in the prior art.

It is fundamental that to establish *prima facie* obviousness, all of the claim limitations must be taught or suggested by the prior art. See MPEP 2143.03, “All Claim Limitations Must Be Taught or Suggested.” The vague statement in Exhibit Y regarding properties of titanium for pigments, that “[m]odifications have been developed to produce certain desirable characteristics for various specific uses” does not amount to a specific teaching or suggestion to use a titanium dioxide layer having an absorption between 3% and 15%, a reflection of at least 40%, or a reflection in a range of 40% to 60%, in the wavelength range of 320 nm to 480 nm in a fireproof glazing unit.

It is the applicants' disclosure which teaches the desirability of absorption in the claimed percentage range within the wavelength spectrum from 320 nm to 480 nm (claim 8). Similarly, it is the applicants' disclosure – not the prior art – which teaches the desirability of a reflection of at least 40% within the wavelength spectrum from 320 nm to 480 nm (claim 9). Finally, it is the applicants' disclosure – not the prior art – which teaches the desirability of a reflection 40% to 60% within the wavelength spectrum from 320 nm to 480 nm (claim 10).

The motivation relied upon by the Office for combining the teaching of the applied references so as to arrive at the claimed invention comes from the applicants' disclosure of their invention rather than coming from the applied prior art. Consequently, the record indicates that the Office relied upon impermissible hindsight in rejecting the claims. See *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 1553, 200 USPQ 303, 312-13 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984); *In re Rothermel*, 276 F.2d 393, 396, 125 USPQ 328, 331 (CCPA 1960).

Accordingly, for all of the reasons provided above the rejections are deficient and must be withdrawn.

### **III. Allegations Regarding Common Knowledge**

MPEP § 2144.03 governs the Patent Office's ability to rely on alleged "common knowledge" in rejecting an application, and the procedure required in connection with such allegations. First, the MPEP admonishes that "while 'official notice' may be relied on, these circumstances should be rare when an application is under final rejection."

Second, "ordinarily, there must be some form of evidence in the record to support an assertion of common knowledge." If official notice is taken without evidence in the record,

the basis for such reasoning must be set forth explicitly. The examiner must provide specific factual findings predicated on sound technical and scientific reasoning to support his or her conclusion of common knowledge [and] . . . The applicant should be presented with the explicit basis on which the examiner regards the matter as subject to official notice and be allowed to challenge the assertion in the next reply after the Office action in which the common knowledge statement was made.



If the applicant challenges an assertion of common knowledge as not proper, the examiner must support the finding with adequate evidence.

“It would not be appropriate for the examiner to take official notice of facts without citing a *prior art* reference where the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well-known. For example, assertions of technical facts in the areas of esoteric technology or specific knowledge of the prior art must always be supported by citation to some *reference work recognized as standard in the pertinent art.*” MPEP 2144.03, underlining in original; italics emphasis added.

A critical allegation of common knowledge was made in the present action, is hereby challenged. Specifically, the rejection states that “[i]t is also available knowledge to one of ordinary skill in the art that TiO<sub>2</sub> used as laminates, glazes, or combinations with other materials as nanoscale particles is transparent to optical light, but highly reflective to UV light.” Furthermore, to support the rejections it must be implicit in the allegation that a TiO<sub>2</sub> layer as claimed is transparent such that it can be used in fireproof glazings such as windows, as described in the present application, and sufficiently absorptive and reflective of UV radiation that it can protect a fireproof layer from degradation. The applicants submit that this was not common knowledge, but rather is a discovery of the applicants.

Neither the original applied references, nor the new references (Exhibits X, Y, and Z) support the allegation. It is submitted that two properties regarding TiO<sub>2</sub> are separately known in the art under different conditions. First, it is submitted that it is known that a TiO<sub>2</sub> layer can be made sufficiently thin that it is transparent so that it can be used on objects such as windows. Separately, it is known that TiO<sub>2</sub> used as an opacifying pigment – not as a layer, and not as a transparent layer – can provide UV protection. See, for example, Exhibit X, pages 2-3 of 4:

By far its most widely used application is as a pigment, where it is used in powder form, exploiting its optical properties.

...

The most important function of titanium dioxide however is in powder form as a pigment for providing whiteness and opacity.

...

The high refractive index and bright white colour of titanium dioxide make it an effective opacifier for pigments. The material is used as an opacifier in glass and porcelain enamels, cosmetics, sunscreens, paper, and paints. One of the major

advantages of the material for exposed applications is its resistance to discoloration under UV light.

Exhibit Y refers again to  $\text{TiO}_2$  as a pigment. Moreover, Exhibit Y teaches that the property that has made titanium dioxide so valuable in the paint industry is the change in direction of visible light as it passes through  $\text{TiO}_2$ , measured as the refractive index. That is what gives the compound ( $\text{TiO}_2$ ) such great hiding or covering power in paints according to Exhibit Y. Table T20, page 884, of Exhibit Y teaches that  $\text{TiO}_2$  is used for whitening, giving opacity and hiding power.

Exhibit Z refers also to  $\text{TiO}_2$  as a colorant, pigment and filler. Moreover, Exhibit Z teaches that  $\text{TiO}_2$  has a remarkably high refractive index an exceedingly high reflectance. It offers maximum opacity or hiding power as well as imparting whiteness and brightness to the products in which it is used according to Exhibit Z. In this context, Exhibit Z teaches that it also affords protection from UV degradation.

In the foregoing argument, Exhibits X and Z have been addressed on their merits, however the documents are not prior art and cannot be used to substantiate the allegations of common knowledge. MPEP 2144.03: “It would not be appropriate for the examiner to take official notice of facts without citing a **prior art reference** where the facts asserted to be well known are not capable of instant and unquestionable demonstration as being well-known” (underlining in original; boldface emphasis added). Exhibit X has a publication date of April 19, 2003, less than a year before the filing date of the present application, and after the filing date of the European priority application.

### CONCLUSION

Withdrawal of the rejections and allowance of all pending claims are respectfully requested.

If the examiner does not believe that the foregoing amendments and remarks place the application in condition for allowance, then the applicants respectfully request the examiner to contact the undersigned attorney to arrange for an interview prior to issuance of an official action on the merits.

Respectfully submitted,

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